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## BEEF CATTLE FEEDING COSTS.<sup>1</sup>

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We have come to think of the phrase "beef cattle feeding" as referring to that short period in the animal's life during which it is confined within the limits of a few square feet upon a Corn Belt farm, and to consider the operation mainly with reference to the large quantities of highly concentrated farm products consumed by the animal. We must not overlook, however, the highly important fact that this steer is being used at the same time and in the same operation as a means of converting the farm by-products into marketable commodities for human consumption. Chief among these otherwise probably unmarketable by-products are straw, stover, leguminous roughages, and hay, a considerable amount of which will always be grown. While the grain feeding of cattle has been an important part of the livestock industry, the beef animal has always furnished the principal means of utilizing the production of that seventy-five percent of the land area which lies outside our improved farm area.

It has been estimated by livestock authorities of the United States that from 80 to 95 percent of the cattle slaughtered on the range, or arriving at market directly from the range, have never tasted grains of any kind; while as large a portion as 20 to 40 percent of the cattle slaughtered on the farm, or arriving at market directly from the strictly corn regions of the United States have never been fed grain. This means roughly that from two thirds to four fifths of the entire beef cattle population of the United States is produced entirely upon roughages, principally grass. Therefore, while the figures which may be presented represent conditions for that type of meat production under study, *i.e.*, winter feeding of beef cattle, they apply to but a part of the industry as a whole.

The winter feeding of stocker animals, whether cattle, sheep or stocker hogs, is one of the most elastic enterprises of the farm. Other than some fore-hand preparation in the way of equipment and possibly credit, short feeding is altogether a matter of choice on the

<sup>1</sup> Paper read at the eleventh annual meeting of the American Farm Economic Association, December 31, 1920.

ordinary mid-western farm, that carries a well-balanced rotation. The farmer can easily change his method of marketing crops from that of driving them to market to that of hauling them whenever he feels that selling his feedable crops will pay him better than putting them through cattle, or when it may appear to him that the future does not justify his paying the prices asked for feeder animals, or again when a series of losses leads him to discontinue feeding until some time that appears more advantageous.

And so, after the experiences of the past two winters, when many feeders took losses, and in view of the present credit stringency, it is not surprising to find a marked decrease in the number of beef cattle on feed today. In Illinois the livestock surveys of the Illinois Farm Bureau show that the feeding of cattle this winter has dropped off in that state from 30 to 33 percent as compared with what it was one year ago. The experiences of the Office of Farm Management in establishing the five cattle feeding routes this winter, linked together with gossip which has been picked up while in the field, indicates that cattle feeding generally throughout the Corn Belt is right now about seventy-five percent of normal.

This falling off in feeding is not entirely the result of the past year's reverses, but is in large measure due to present credit conditions and the indefinite outlook. Experience has indicated to many feeders that in normal times there has been too much gamble in feeding, and, as the feeder interprets the present in the light of the past, he is becoming more and more convinced that the long time average results must show less risk and greater remuneration if feeding is to be resumed. This may not mean that he will go out of the field of livestock production, but that he will work other types of livestock into his system of farming unless he can indulge in cattle feeding with better assurance of remuneration.

Let us observe the cattle feeding situation during the past five years, using the year 1915 as a base. In Chart I the monthly prices of cattle and the three principal feeding stuffs, corn, hay and cottonseed meal, are expressed in index figures, the base being the average of the twelve months during 1915. It is noticeable that during 1916 the price indices followed very closely together. During the first month in the year 1917 hay prices dropped to about one half what they were in December, 1916, but the other two feeds, corn and cottonseed meal, began to advance above cattle prices in this same month. All prices used in making this chart were gathered by the Bureau of Crop Estimates and indicate average farm prices, or, in the case of cottonseed meal, the average prices received by local country dealers.

INDEX OF MONTHLY PRICES  
OF  
CATTLE AND FEEDING STUFFS

1915 - 1920, YEAR 1915 - 100%

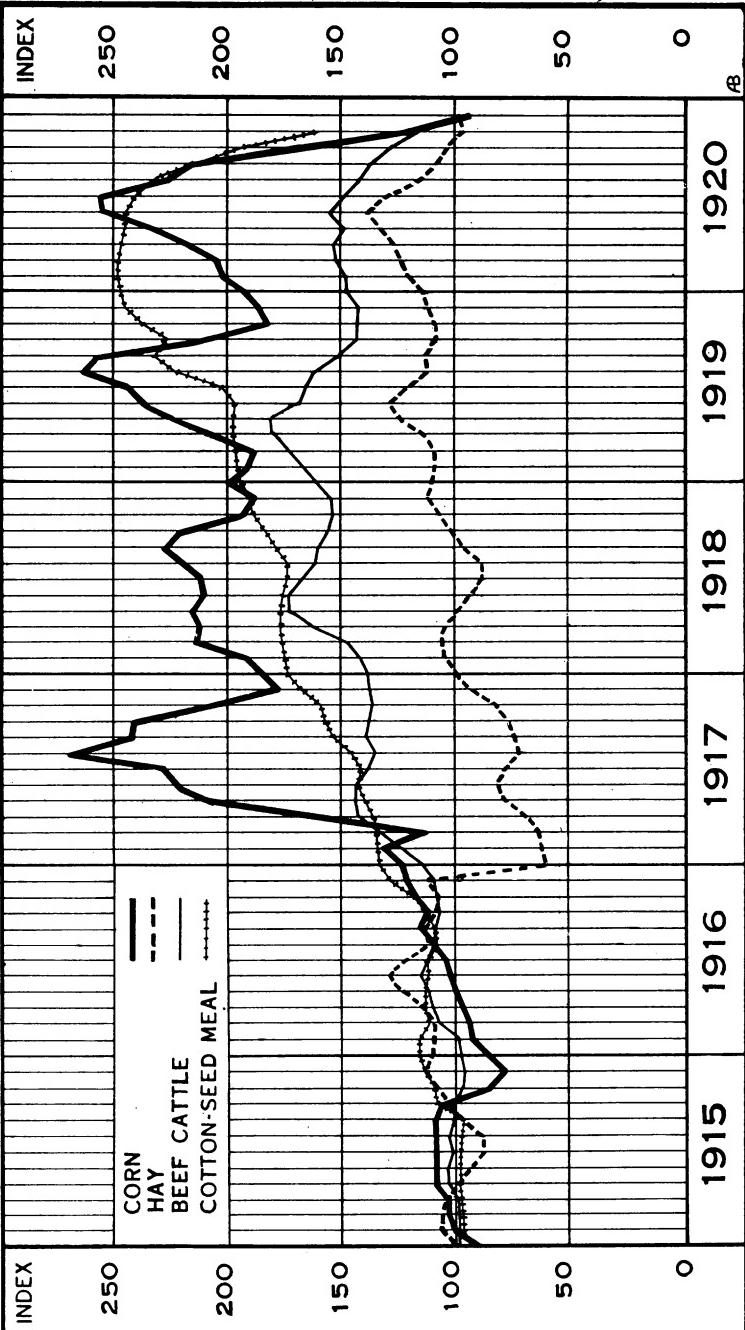


CHART I.

During the past four years there appears to be little correlation between beef cattle prices and the prices of corn—the one feedable crop which constitutes from 65 to 70 percent of the steer's winter feed bill. (Corn either in the form of grain or in the silo has been found to constitute from 65 to 70 percent of the value of all feeding stuffs going toward making the gain in the winter-fed cattle under study.) After four years of high corn and low cattle prices, we are now in the midst of a time of low feed prices and somewhat better cattle prices relatively but with other factors, such as lack of credit, the unsettled strength of meat demands, and a vivid recollection of recent losses, serving to offset this advantage and thus to lower the number of feeder cattle in the Corn Belt feed lots.

#### GENERAL RELATIONS OF WINTER CATTLE FEEDING TO THE FARM ORGANIZATION.

The Office of Farm Management and Farm Economics, in coöperation with the Bureau of Animal Industry and the State Experiment Stations of the states where work is conducted, began the study of beef cattle feeding costs covering the feeding operations of the winter of 1918-19. Five general areas, one in each of five Corn Belt States, were selected, namely, east central Indiana, north central Illinois, west central Iowa, eastern Nebraska and central Missouri. As this work did not start until the summer of 1919, the figures on the feeding in the winter of 1918-19 are survey figures. In the fall of 1919 five cattle feeding routes were established, each route aiming to carry twenty-five farms. Surveys were again taken in the summer of 1920. All figures which I will give for the winter 1919-20 are those for the route farms and survey farms combined unless otherwise specified.

In these studies a survey of the whole farm business was made wherever cost figures were gathered upon feeding cattle. In fact, in all our livestock cost work, concerted effort will be made to obtain a farm business analysis from each farm supplying cost figures upon animal enterprises. This is done for the purpose of studying the relation of farm enterprises, the economic place of the livestock enterprise in the organization and operation of each farm or group of farms, and also, as I later hope to bring out, to help in getting a better perspective of enterprise cost figures in their relation to farm profits.

From the five hundred or more farms surveyed for the 1919 crop year, 333 have been selected (Table I) as the farms giving in most accurate detail the total quantities of feedable crops produced and their ultimate disposition. It is first of interest to note that practically 74

percent of the entire area of these farms is in cultivated crops other than rotation pasture. Approximately 44 percent of this cultivated area was in corn in 1919. The remainder of the cultivated area is devoted principally to hays, wheat and oats. One fourth of the total area of these farms is devoted to pastures, the lowest percentage of total farm area appearing in Illinois where  $11\frac{1}{2}$  percent is in pasture, the highest shows approximately 34 percent—in Missouri.

TABLE I.—*Relation of Cattle Feeding to Farm Business (Corn Belt Area, June, 1919 to June, 1920, 333 Farms.)*

State.	Farms.	Farm Area.	Percentage of Farm Area.			Income from Cattle.	Crops Fed Cattle.
			Cultivated.		Pasture.		
			Total.	Corn.	Perm. and Rot.		
Indiana.....	45	Acres 209.8	65.7	44.6	27.7	20.4	37
Illinois.....	99	225.1	83.6	42.4	11.5	24.6	26
Iowa.....	46	276.2	71.3	50.5	23.0	24.6	33
Nebraska.....	89	232.1	76.6	43.4	19.6	29.1	46
Missouri.....	54	305.3	62.7	39.8	34.1	21.1	42
All.....	333	244.9	73.7	43.8	25.8	24.5	40

I have used two methods of showing the importance of the cattle feeding enterprise in the farm business. One is the usual method, that is, showing the relation of the net returns from cattle to the net income of the entire farm. This, I believe, does not show the enterprise in its proper relation to the other enterprises of the farm, especially as to the handling of feeder animals, and when the margin between the purchase price of these animals and their sales price is narrow. Table I shows that the net income from these feeding cattle constituted approximately 25 percent of the net farm receipts.

In the last column of this table I have attempted to show the approximate percentage of feedable crops, raised on the farm or purchased and hauled to the farm, that were consumed by the beef cattle purchased and fed out. This figure as yet is somewhat of an approximation, as it has been necessary to estimate, for example, such items as the total carrying capacities of pastures in animal unit days, the animal unit pasture days for standing corn stalks and a few items of this nature, but for the principal feedable crops it is accurate, and I believe gives a somewhat truer picture of the importance of this enterprise in the farm business and its relation to the other livestock enterprises on the farm. An enterprise which converts into a market-

able product close upon forty percent of any farm's feedable crops surely cannot be left out of its system of farming, and these feedable farm crops thrown upon the markets without causing serious disruption and a resultant lowering of the production of food for human consumption.

#### VARIATIONS IN COSTS.

There is usually wide variation in the cost of similar farm products grown upon adjoining farms or even upon the same farm in different years. These differences are due primarily to the difference in efficiency of management and care in performing the necessary operations of production, but may often arise from conditions over which the producer has no control. As an example, let us take the cattle feeding cost figures gathered in Iowa for the winter 1919-20. The amount of grain fed to these Iowa cattle for each hundred pounds' gain in live weight varied from less than 500 pounds in one case to nearly 1,500 in another. The daily gain per head among these Iowa cattle varied from .8 of a pound to 3.9 pounds. The cost of a pound gain ranged from 10 cents to 43 cents. Net returns per steer varied from a loss of \$61.82 per head in one drove to a profit of \$50.50 in another when charging them with feeds at cash farm prices.

TABLE II.—*Cost per Hundredweight of Cattle. (Corn Belt Area, Winter 1919-1920, 545 Doves, 20,999 Cattle.)*

Cost per Hundred-weight, Dollars.	Number of Doves.	Doves, Cumulative Percentage.	Cattle, Cumulative Percentage.	Number per Group.
8 to 9.....	7	1.3	1.3	277
9 to 10.....	7	2.6	3.2	404
10 to 11.....	18	5.9	7.1	803
11 to 12.....	56	16.1	16.3	1943
12 to 13.....	92	33.0	33.9	3608
13 to 14.....	100	51.4	54.6	4338
14 to 15.....	88	67.5	69.8	3187
15 to 16.....	67	79.8	81.3	2422
16 to 17.....	57	90.3	90.8	1992
17 to 18.....	23	94.5	94.2	720
18 to 19.....	16	97.4	97.9	782
19 to 20.....	10	99.3	99.5	331
20 to 21.....	2	99.6	99.8	50
21 to 22.....	1	99.8	99.9	25
22 to 23.....	1	100.0	100.0	27
Total.....	545			20,999

With wide variations in the quality of feeder cattle, in quantities of feed necessary to gains, the labor expended in care of animals, the gain made by hogs following, and other factors in cattle feeding, we

find a resultant wide variation in the cost of the finished product when laid down at market. We have (Table II), for the cattle under observation in the winter of 1919-20, a variation in the cost per hundred pounds of finished beef ranging from \$8.00 to \$23.00. The average cost of a hundred pounds lies between \$14.00 and \$15.00. Thirty per cent of the 21,000 cattle cost above this average figure. All of the beef cattle feeding work to date will show that an average cost figure includes at least 60 percent of production.

The cost per hundredweight of finished corn-fed cattle is influenced very materially by the grade of feeder animal at the beginning. The prices paid for feeder cattle by those men who have a cost exceeding \$20.00 a hundred were considerably higher than the feeder cattle prices paid by the farmers producing the \$8.00 to \$9.00 finished cattle. The prices at which the \$20.00 cattle finally sold also indicate that they, as finished cattle, were superior in grade to the \$8.00 to \$9.00 groups. This varying cost array, with its finished products ranging from \$8.00 to \$23.00 indicates that there are always some producers outside of the marginal cost line, producers who will get under it in time or ultimately drop out. These figures bear out the practical impossibility of establishing a price which will be remunerative to all producers and not increase the supply far beyond the point of visible demand.

#### SOME IMPORTANT BASIC UNIT FACTORS IN BEEF PRODUCTION.

In our livestock cost work particular stress is being placed upon the securing of unit quantities of all cost factors and credit factors, to which, at any time and under any price level, current values may be affixed and from which the cost of production may thus be determined. The item of feed alone has been found in this study to constitute from 75 to 85 percent of the total cost of gain made by beef cattle in the dry-lot. The economy of production, then, rests primarily upon proper feeding and management and upon the efficiency of cattle in converting feeding stuffs into finished beef. Man and horse labor used in the care and feeding is the item of second importance constituting from 7 to 8 percent of the cost of gain in the steer.

As I have already said, corn, both as grain and in the form of silage, exceeds in total value the cost of all other feeding stuffs consumed by the cattle in our beef studies. Table III gives the quantities of feed and labor required to make one hundred pounds of beef in the 35,219 cattle covered in the studies during the past two years.

Our work so far seems to indicate that upon the average, all costs other than the feed bill are balanced off and paid for through the by-products in feeding—manure and pork—providing the cattle do not spend too much time in pasture. These expenses, other than feed, which are met by the value of pork and manure are the cost of man and horse labor, interest upon capital invested in cattle and equipment, depreciation and repairs upon the buildings used, veterinary, insurance, taxes, incidentals and the marketing expense.

TABLE III.—*Measures of Some Important Basic Unit Factors in Producing 100 Pounds Gain in Corn-Fed Cattle. (Corn Belt Area, 1918-19 and 1919-20. 866 Drovers, 35,219 Cattle.)*

Factors.	Indiana.	Illinois.	Iowa.	Nebraska.	Missouri.
Gain per head, lbs.....	278	253	357	278	246
Daily gain per head, lbs.....	1.5	1.4	2.2	1.8	1.3
<i>Costs</i>					
<i>Feed</i>					
Grain, lbs.....	535	561	701	729	443
Commercial concentrates, lbs.....	106	79	37	14	113
Dry roughage, lbs.....	216	338	301	506	248
Silage, lbs.....	1,588	2,201	348	113	854
Pasture, days.....	13	12	12	11	46
<i>Labor</i>					
Man hours.....	5.0	6.4	2.4	4.7	3.8
Horse hours.....	1.5	3.6	2.0	3.5	4.5
<i>Credits</i>					
Loads of manure.....	1.5	2.5	.7	1.4	.3
Pounds of pork.....	25.4	21.3	33.5	34.3	21.2

The cattle coming under our observation in Missouri, for example, were on pasture or stalks 46 days of the 194 they were on the farm. The by-products from these Missouri cattle could not pay for all the expenses other than feed; but in the other four states where steers were on pasture or stalks only 12 or 13 days they were able to meet the expenses other than feed by the manure and pork that was produced behind them. The low credit of 21.5 pounds of pork in Illinois may be attributed principally to an epidemic of "flu" among hogs in Dekalb County during the 1919-20 winter.

#### CATTLE SHOWING LOSSES PAY SOMETHING FOR FEED.

Charging feeds and supplies to livestock at monthly cash farm prices as they are consumed has become a more or less established method in determining costs in animal production. This practice of using the opportunity cost or alternative price in the charging of farm

feeds evolved from a desire upon the part of the producer to determine whether each of the present parts of his entire farm system was paying him as well as might some competing crop or type of livestock. In following this practice of looking at each enterprise independent of the whole farm business there has been danger during the past few years of showing the farmer a book loss upon as much as 90 percent of his marketed produce while he well knows that his farm business has been profitable. And upon the other hand, will we not have the consumer of these livestock products demanding to be shown just how producers can take apparent losses and still show evidences of prosperity? The use of opportunity costs or the alternative price may be justified when comparing the *relative* profitability of enterprises, but there is serious question in the use of those opportunity costs in determining the profits and losses of the livestock enterprises.

TABLE IV.—*Iowa Cattle Feeding Results With Returns Shown in Amounts Received for Corn Consumed.*

Method and Year of Study.	Survey 1918-19.	Survey 1919-20.	Route 1920.
Average farm price of corn.....	\$1.41	\$1.31	\$1.32
Loss per steer (feeds at cash farm prices).....	9.80	10.19	5.11
Average price realized for corn when fed to cattle.....	1.18	1.03	1.17
	Percent	Percent	Percent
Cattle that paid nothing for corn.....	3	3	—
Cattle that returned less than \$1.00 per bushel for corn	35	43	38
Cattle that returned \$1.00 to \$1.50 per bushel for corn	37	34	24
Cattle that returned \$1.50 to \$2.00 per bushel for corn	12	11	38
Cattle that returned over \$2.00 per bushel for corn.....	13	9	—

Let us take as an example the returns of cattle studied in Iowa during the past two winters. When charging these cattle with farm grown feeds at cash farm prices there was a book loss upon the average for all cattle fed. Still, while the average of these Iowa cattle were unable to pay the full opportunity costs upon all the feeding stuffs, they were able, after supplying a market for farm roughages at what may be called a good price, to return a sufficient amount for the corn that was fed to them to apparently cover the cost of producing this corn. In constructing Table IV the Iowa steers have been charged with all feed other than corn at monthly cash farm prices as these other feeds were being consumed, the balance between the gross income from each drove of steers and the amount they were charged for feed other than corn has been determined, and in dividing this balance by the number of bushels of corn fed to each drove

we are able to show what the steers paid for their corn. Of the Iowa cattle studied during the winter of 1918-19 only three percent did not sell for enough to return something for corn after paying for the rest of their feed; sixty-two percent of the cattle returned better than a dollar per bushel for corn. In the 1919-20 winter fifty-four percent of the cattle in the survey study and sixty-two percent of the cattle on the detailed cost route returned a dollar per bushel or better for corn in addition to paying market prices for the rest of their ration. While the average of these cattle fell somewhat short of paying cash farm prices for all their feed, during the first winter (1918-19) they returned an average of \$1.18, those in the survey of the next winter returned \$1.03, and the cattle on the detailed cost route the same winter (1919-20) returned \$1.17, for every bushel of corn consumed.

#### RELATION OF CATTLE RETURNS TO FARM PROFITS.

The cost story of cattle feeding, for either producer or consumer, is incomplete without a presentation of the setting of cattle feeding within the farm business and the financial results of the farm business as a whole. As an extreme example let me cite the record of an Illinois farm for 1919-20. For this farm 52 percent of the income was from 60 feeding cattle, with hogs and cattle together constituting 78 percent of the income from all sales. There was a loss of \$2,741.32 upon the 60 head of feeding cattle when charging them with feed at cash farm prices; in other words these cattle fell over twenty-seven hundred dollars short of paying \$1.40 for corn and \$25.00 a ton for clover hay. As the hogs leaving this farm sold for fourteen cents they probably did not get a 13 to 1 ratio for their corn, should this corn be charged to them at the opportunity prices. Nevertheless this farm made 8.4 percent on an investment of \$42,000. This means that, while the Illinois farmer's livestock did not pay him a price for his grain and hays comparable to what he could have received for these same crops at market, they apparently paid him a considerable margin over and above what it cost to produce them.

Or looking at average figures upon several farms (Table V) where these figures were gathered from June 1, 1919, to June 1, 1920, it is readily noticeable that there is no correlation between cattle losses, when these cattle have been charged with feeds at cash farm prices, and either the farm labor income or the percent earned upon the capital invested. However there is every reason to believe that in Illinois, where the cattle enterprise could pay only twenty-seven cents for corn, the losses in feeding cattle sapped the profits made in the other branches of the farm business. On the Iowa and Nebraska

farms studied, the minus labor income may be attributed, in the main, to the relatively high capitalization of the farms, as placed by the farmer. You will notice in Table V that the Missouri and Indiana cattle, though not able to compete with the market for corn, were able to return a price sufficient to warrant them a place in the system of farming.

TABLE V.—*Relation of Returns From Cattle to Farm Profits. Corn Belt Area*

—*Winter 1919–20.*

State.	Farms.	Farm Average.					
		Capital.	Labor Income. <sup>1</sup>	Percent Earned on Investment.	Percent Feedable Crops Fed to Cattle.	Feeding Loss. <sup>2</sup>	Price Returned for Corn.
Indiana.....	39	\$51,621	\$1032	7.0	37	\$—654	.84
Illinois.....	99	79,359	997	6.3	26	—1237	.27
Iowa.....	43	102,228	—176	4.8	33	—337	1.08
Nebraska.....	62	84,885	—1358	3.4	46	—557	1.00
Missouri.....	44	76,330	1417	6.9	42	—1262	.65

And so to correctly understand our livestock cost data they should be interpreted in the light of results from the farm as a whole and not alone in the light of the independent enterprise. It is probably still safe for the feeder to consider his livestock as a means of marketing farm crops and as such to expect them to receive market prices for these farm crops when they are driven to market; but should times and occasions arise when they cannot do this he must keep ever in mind the long time average results of his entire farming business recognizing the place of livestock in the maintenance of this farm income.

#### CONCLUSION.

Beef cattle feeding in the corn belt States is now in what may be termed a temporary slump awaiting a time when there may be less risk in the enterprise and until general economic conditions become more healthy. Cattle feeding costs show, as do studies in other farm products, a wide range between farms and from year to year in the same general area. There must still be devised a method of more nearly arriving at specific costs in any farm enterprise for use not only in comparing competing enterprises, but cost figures which will acquaint the consuming public in general with the true condition of affairs in agricultural production. Whatever the use to which enterprise studies finally may be put, whether for comparative purposes or to show the specific costs of salable products, attention should be given to the study of total profits of the farm in which the enterprise forms a part.

<sup>2</sup> When charging feeds at cash farm prices.